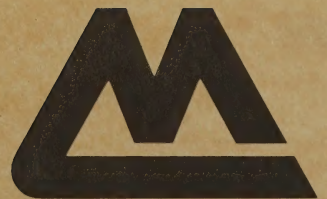


HELENA AIR QUALITY SURVEY -- 1984

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HELENA AIR QUALITY SURVEY -- 1984

Submitted to:

Lewis and Clark County  
Health Department  
City-County Building  
310 North Park Avenue  
Helena, Montana

Submitted by:

Mountain International, Inc.  
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July 16, 1984

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## Preface

Since 1981 the Lewis and Clark County Health Department has been surveying Helena area residents to measure the use of wood/coal burning appliances, assess perceptions of air quality, and determine opinions regarding potential methods for reducing local air pollution. The 1981-1983 surveys were limited in scope and lacked statistical precision due to the relatively small number of individuals interviewed. For its 1984 project, the Health Department decided to expand the substantive content of the survey and improve its statistical reliability by significantly increasing the sample size. Mountain International, Inc., a Helena based social, economic and management consulting firm, was retained to assist the Health Department prepare the survey instrument, develop the survey sampling procedures, analyze the collected data, and prepare the project report. County Health Department employees conducted the survey interviews.

## Survey Design

The 1984 Air Quality Survey was conducted with seven targeted objectives, including:

1. Measure the extent to which Helena area households burn wood/coal for home heating, as well as plans to change the pattern of household fuel use.
2. Determine the extent to which coal is being used as a fuel for home heating.
3. Measure perceptions of Helena's air quality, particularly the extent to which the public perceives a local air pollution problem.
4. Assess the public's perception of the cause(s) of Helena's air pollution.
5. Identify the degree of public support for various remedial activities intended to improve local air quality.



6. Identify media sources used by the public to obtain information about air quality.
7. Provide a general demographic profile of households that burn wood/coal and assess whether personal demographic attributes are associated with opinions toward air quality, its perceived causes, and methods of remediation.





## METHODOLOGY





### Survey Administration and Sample

The 1984 Air Quality Survey was conducted by telephone using a structured questionnaire with forced choice questions where the person being interviewed was asked to select one or more answers that came closest to matching their personal opinion. Households burning wood/coal were asked 24 questions; "non-burner" households were asked 19 items. The two survey's were identical except for a series of questions that inquired about burning habits (e.g., fuel type, time-of-day when burning was undertaken, etc.) principally directed toward "burner" households. The Appendix contains copies of both survey instruments.

The survey's sample universe consisted of all Helena area households served through the local telephone exchange, identified by telephone prefix numbers 227, 442, 443, 449, and 458. Prefix 444 was not included since it is reserved for governmental and commercial usage and does not include residential listings. The telephone sample universe covered a geographic area approximately equal to Helena and the Helena valley bounded on the south by Montana City, on the east by Winston and the Missouri River, on the north by the Sieben Ranch, and on the west by the Scratchgravel Hills and Continental Divide. Canyon Creek, York, and Clancy were outside the sample area.

The survey aimed at completing 400 interviews with households in the Helena area. Sample households were selected using random digit dialing in proportion to the number of households within a given telephone prefix number. This process involved the following steps.

First, the proportion of residential households by telephone prefix code was determined from the listing of telephone numbers in the Helena area. For example, the 442 prefix contains the largest number of residential listings and constituted 49.4 percent of all residential telephones listed in the Helena area.



Second, the proportion of total telephones by prefix was converted to a survey interview target anticipating 400 completed interviews. The 442 prefix, for example, was allocated 198 completed interviews from the proposed sample of 400 households.

Third, five lists, one per telephone prefix, containing a total of 3,000 four-digit numbers were generated at random by computer program. No numbers were duplicated on a given list.

Fourth, interviewers were assigned a three-digit telephone prefix (e.g., 442, 227, etc.) and contacted potential sample households by dialing the randomly generated four-digit telephone number. As such, every telephone in the Helena area including unlisted numbers had an opportunity to be included in the sample. Interviews were conducted only with residential households, not commercial establishments or governmental agencies. Interviews were conducted for a given telephone prefix until its assigned quota of completed interviews was met or surpassed.

The upper portion of Table 1 shows the Helena area telephone prefixes, their share of total residential phones, the target sample, and the actual number of completed interviews. In total, 407 questionnaires were completed, slightly exceeding the target of 400 interviews.

The lower half of Table 1 shows the total number of telephone calls made during the survey, the share of completed interviews, refusals, and calls where contact could not be established with a respondent. One of the disadvantages of the random digit dialing technique is that the list of potential telephone numbers includes codes that have not yet been assigned to a telephone subscriber, disconnected numbers, and commercial establishments. Also, some percentage of people are not home when called and others decline to participate in a survey for one reason or another. In total, the survey achieved an interview completion rate of 24.2 percent, about average for the random digit process; the refusal rate of 16.0 percent also was typical. Interviews were conducted in the evening hours between 6:00 p.m. and 9:00 p.m. on weekdays during the period extending from May 16 to May 31, 1984.

The estimated sampling error for the 400 completed interviews is  $\pm$  5.0 percent. Given a sample of 400 households, if the response to a





Table 1. Sample Size.

<u>Telephone Prefix</u>	<u>Prefix As Share of Total Phones</u>	<u>Target Sample</u>	<u>Sample Achieved</u>
227	11.3%	45	45
442	49.4%	198	204
443	31.1%	124	124
449	0.1%	1	1
458	8.1%	32	33
Total	100.0%	400	407

Outcome of Survey Calls

<u>Telephone Prefix</u>	<u>Calls Completed</u>	<u>Refused to Participate</u>	<u>No Answer/ Disconnect</u>	<u>Total</u>
227	45	14	94	153
442	204	154	421	779
443	124	77	349	550
449	1	0	0	1
458	33	25	143	201
Total	407	270	1,007	1,684

Source: Mountain International, Inc.





given questionnaire item shows that 60 percent agree with the item, then the odds are 95 to 5 that the true response value is between 65 and 55 percent. Sampling error decreases with the size of the sample. It is necessary to quadruple the sample size to cut the error rate by half.

The results of the survey are presented in a series of tables as percentages and numerical tabulations. Unless otherwise indicated, information from all 407 interviews is reported in the analysis.

### Characteristics of the Sample

Table 2 profiles the demographic characteristics of the survey sample. Forty-five percent of the households surveyed burned either wood or coal to at least partially heat their homes; 55 percent of the households were "non-burners."

The survey sample was almost evenly split between male and female respondents and, accordingly, closely matched the sex ratio of both Helena and Lewis and Clark County. The geographic boundaries of the survey area (Helena/Helena valley) do not correspond to a single census enumeration unit. As such, comparison between the sample and the population of the region must be approximate. With 90.3 percent of the county's total population located in the Helena/Helena valley area and with over 61.6 percent of that total residing inside the Helena city limits, both Lewis and Clark County and Helena are valid benchmarks with which to compare the survey sample.

The survey sample also closely matched the age profile of the city/county except for the 18 to 24 year age group which was under represented, and the 35 to 44 year age group that is over represented. In part, the under representation of the 18 to 24 year olds is statistical in nature caused by the inclusion of Carroll College students in the city/county population. Many of those



Table 2. Characteristics of Sample.

<u>Use of Wood/Coal Fuel</u>		
	<u>Number</u>	<u>Percent</u>
Burners	183	45.0%
Non-Burners	224	55.0%
Total	407	100.0%

<u>Sex of Respondent</u>				
	<u>Number</u>	<u>Sample</u> <u>Percent</u>	<u>Helena</u>	<u>Lewis &amp; Clark County</u>
Male	199	48.9%	47.6%	49.0%
Female	204	50.1%	52.4%	51.0%
No response	4	1.0%	NA	NA
Total	407	100.0%	100.0%	100.0%

<u>Age of Respondent</u>				
	<u>Number</u>	<u>Sample</u> <u>Percent</u>	<u>Helena</u>	<u>Lewis &amp; Clark County</u>
15-17 years	19	4.7%	6.5%	7.3%
18-24 years	34	8.4%	19.0%	17.0%
25-34 years	105	25.8%	23.3%	24.5%
35-44 years	89	21.8%	14.0%	15.4%
45-54 years	48	11.8%	11.2%	11.9%
55-64 years	48	11.8%	11.4%	11.3%
65-74 years	39	9.6%	8.3%	7.7%
75 years & older	23	5.6%	6.2%	4.9%
No response	2	0.5%	NA	NA
Total	407	100.0%	100.0%	100.0%





Table 2. Characteristics of Sample (Continued).

	<u>Location of Respondent</u>	
	<u>Number</u>	<u>Percent</u>
Westside of Helena <sup>1</sup>	109	26.8%
Eastside of Helena <sup>1</sup>	161	39.6%
East Helena, La Casa Grande/Eastgate	30	7.4%
West Helena Valley <sup>1</sup>	40	9.8%
East Helena Valley <sup>1</sup>	34	8.4%
Kessler School/Highway 12 West area	12	2.8%
Montana City/Clancy Area	10	2.5%
No response/other	<u>11</u>	<u>2.7%</u>
Total	407	100.0%

	<u>Sex of Respondent</u>			
	<u>Number</u>	<u>Sample Percent</u>	<u>Helena</u>	<u>Lewis &amp; Clark County</u>
Less than \$10,000	55	13.5%	23.6%	26.3%
\$10,000-\$20,000	102	25.1%	33.0%	32.5%
\$20,000-\$30,000	95	23.3%	24.5%	24.4%
\$30,000-\$40,000	75	18.4%	11.0%	10.3%
\$40,000-\$50,000	21	5.2%	4.2%	3.5%
\$50,000 and more	24	5.9%	3.7%	3.0%
No response	<u>35</u>	<u>8.6%</u>	<u>NA</u>	<u>NA</u>
Total	407	100.0%	100.0%	100.0%

<sup>1</sup>Divided along Last Change Gulch and Montana Avenue.

Source: Mountain International, Inc.



individuals reside in the campus dormitories and are not reachable by telephone survey. Young adults also are more apt to be single and otherwise "on the go" in the evening hours. A telephone survey is thus apt to miss a larger share of that population through "unanswered calls" than is the case with older persons.

The second page of Table 2 shows the respondents' place of residence and estimated household income level. Again, census enumeration boundaries do not coincide with the survey residence categories but the city/non-city share of the sample generally matches the 1980 Census. In that year, the City of Helena constituted 61.6 percent of the county population exclusive of the Augusta, Lincoln, and Wolf Creek census subdivisions. City dwellers made up 66.3 percent of the survey sample and are thus slightly over represented in the tabulation.

The income level of surveyed households, Helena, and Lewis and Clark County is shown at the base of Table 2. The sample shows a lower share of low income households (i.e., less than \$10,000 annually) and larger share of upper income homes (i.e., \$30,000 or more) than does either the city or county population. More so than is the case with other demographic traits, direct comparison between the sample and city/county income levels must be cautiously undertaken. Almost nine percent of the sample households would not disclose their income level and it is unknown whether they were high, medium, or low income households. Also, the information reported for the city/county was abstracted from the 1980 Census, the most current information available. Wage and income inflation since that date may have altered the area's household income structure.

#### Characteristics of Burners and Non-Burners

The survey anticipated that burner and non-burner households might have different demographic profiles as well as differing opinions about





air quality in the Helena area. Table 3 summarizes several demographic traits of burner and non-burner households. As shown on the top of the table, non-burner households tend to be located inside the city of Helena with burners predominant in the rural areas outside the municipal limits. A particularly striking contrast exists between the eastside of Helena where 68.3 percent of the households were reported non-burners compared with the Kessler/Highway 12 West/Birdseye area where over 90 percent of the residents said their households burned wood or coal. The city versus non-city use of wood/coal for household fuel is statistically significant with the probability of this relationship showing up chance at less than one percent.

Age of household respondent also is strongly related to wood/coal burning. Households occupied by middle-aged adults between 25 and 54 years of age are much more apt to burn wood/coal than homes with young adults or the elderly. Roughly 50 to 55 percent of the middle-aged households burn wood/coal compared with only 20 to 25 percent of the households with respondents 65 years and older.

Increasing household income levels up to \$40,000 annually also is associated with an increasing propensity to burn wood/coal. Among those reporting income of less than \$10,000 per year, only 25.5 percent used wood/coal. The share of burners gradually increases to a peak of 57.3 percent of households in the \$30,000 to \$40,000 income range before receding. See Table 3.

Sex of the survey respondent was not associated with burner or non-burner households. Both such sub-samples had equally proportioned shares of males and females.



Table 3. Household Characteristics of Burners and Non-Burners.

	<u>Location of Household</u>			
	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Westside of Helena	41	22.4%	68	30.4%
Eastside of Helena	51	27.9%	110	49.1%
East Helena, La Casa Grande	15	8.2%	15	6.7%
West Helena Valley	27	14.7%	13	5.8%
East Helena Valley	22	12.0%	12	5.4%
Kessler School/ Highway 12 West	11	6.0%	1	0.4%
Montana City/Clancy	10	5.5%	0	0.0%
Other	5	2.7%	4	1.8%
No response	<u>1</u>	<u>0.6%</u>	<u>1</u>	<u>0.4%</u>
Total	183	100.0%	224	100.0%

	<u>Age of Respondent</u>			
	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
15-17 years	9	4.9%	10	4.5%
18-24 years	13	7.1%	21	9.4%
25-34 years	55	30.1%	50	22.3%
35-44 years	47	25.7%	42	18.8%
45-54 years	26	14.2%	22	9.8%
55-64 years	17	9.3%	31	13.8%
65-74 years	10	5.4%	29	13.0%
75 years & older	5	2.7%	18	8.0%
No response	<u>1</u>	<u>0.6%</u>	<u>1</u>	<u>0.4%</u>
Total	183	100.0%	224	100.0%





Table 3. Household Characteristics of Burners and Non-Burners  
(Continued).

	<u>Household Income</u>			
	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Less than \$10,000	14	7.6%	41	18.3%
\$10,000-\$20,000	40	21.9%	62	27.7%
\$20,000-\$30,000	49	26.8%	46	20.5%
\$30,000-\$40,000	43	23.5%	32	14.3%
\$40,000-\$50,000	12	6.6%	9	4.0%
\$50,000 and more	11	6.0%	13	5.8%
No response	<u>14</u>	<u>7.6%</u>	<u>21</u>	<u>9.4%</u>
Total	<u>183</u>	<u>100.0%</u>	<u>224</u>	<u>100.0%</u>

Source: Mountain International, Inc.



## SURVEY RESULTS





### Characteristics of Wood/Coal Burning Households

Almost half of the Helena area households burning wood/coal reported natural gas as the household's main heat source. Wood ranked second as the most common fuel (31.7 percent) followed by electricity (11.4 percent).

Almost 65 percent of the homes that burned wood/coal used stoves, 31.1 percent used fireplaces and only six homes, or 3.1 percent, of the total claimed a wood/coal furnace. Earlier Health Department surveys estimated the number of wood/coal burning homes in the area at between 35 and 47 percent of which approximately 55 percent used stoves. This survey suggests that the total share of wood burning households is closer to 45 percent and that wood stoves make up almost two-thirds of the burning appliances in use.

A little over one-quarter of the burner households (26.2 percent) reported possession of more than one wood/coal burning appliance, typically a stove and fireplace or two stoves, in different parts of the dwelling. There were 1.29 wood/coal burning appliances reported per burner household. See page 1 of Table 4.

Ninety-five percent of Helena's burner households use wood for fuel, eight homes or 4.4 percent burn coal. Over three-quarters (76.2 percent) of the burners have been using wood/coal for less than eight years, and 49.2 percent claim to have burned for four years or less. Of those burning wood/coal, 39.3 percent claim that it provides less than 25 percent of home heating needs while 47.5 percent said wood/coal provided more than half of the home's heating requirements. Included in the latter population are 54 of the 58 households who defined wood as the household's primary fuel. The share of burner households reporting wood/coal use for more than 50 percent of home heating needs is significantly higher than that identified in the 1983 survey (i.e., 29 percent). See page 2 of Table 4.



Table 4. Characteristics of Wood/Coal Burning Households.

<u>Fuel Used As Main Heating Source</u>		
	<u>Number</u>	<u>Percent</u>
Natural gas	88	48.1%
Fuel oil	5	2.7%
Electricity	21	11.4%
Bottled gas (propane, LPG)	6	3.3%
Wood	58	31.7%
Other	1	0.6%
Do not know/no response	4	2.2%
Total	183	100.0%

<u>Type of Wood/Coal Burning Equipment Used</u>		
	<u>Number</u>	<u>Percent</u> <sup>1</sup>
Fireplace	61	31.1%
Stove	127	64.8%
Wood/coal furnace	6	3.1%
Other	2	1.0%
Total	196	NA

<u>Number of Wood/Coal Burning Appliances</u>		
	<u>Number</u>	<u>Percent</u>
One	134	73.2%
Two	44	24.0%
Three	3	1.6%
More than three	1	0.6%
Do not know/no response	1	0.6%
Total	183	100.0%

Average number of wood/coal burning appliances per user household = 1.29





Table 4. Characteristics of Wood/Coal Burning Households (Continued).

	<u>Household Burn Coal?</u>	
	<u>Number</u>	<u>Percent</u>
Yes	8	4.4%
No	174	95.0%
Do not know/no response	1	0.6%
Total	183	100.0%

	<u>How Long Household Has Burned Wood/Coal</u>	
	<u>Number</u>	<u>Percent</u>
One to two years	42	23.0%
Three to four years	48	26.2%
Five to six years	31	16.9%
Seven to eight years	19	10.4%
Nine to ten years	14	7.7%
Eleven to fifteen years	9	4.9%
More than fifteen years	15	8.2%
No response	5	2.7%
Total	183	100.0%

	<u>Approximate Share of Household Heating Needs Met by Burning Wood/Coal</u>	
	<u>Number</u>	<u>Percent</u>
Less than one-quarter	72	39.3%
Between one-quarter and one-half	23	12.6%
Between one-half and three-quarters	29	15.8%
More than three-quarters	58	31.7%
Do not know/no response	1	0.6%
Total	183	100.0%



Table 4. Characteristics of Wood/Coal Burning Households (Continued).

<u>Time of Day When Household Uses Wood/Coal Burning Appliance Most Often</u>		
	<u>Number</u>	<u>Percent</u>
Mornings (6:00 am to noon)	16	8.8%
Afternoons (noon to 6:00 pm)	3	1.6%
Evenings (6:00 pm to midnight)	86	47.0%
Nights (midnight to 6:00 am)	6	3.3%
Virtually all of the time	48	26.2%
Just on occasion	19	10.4%
Do not know/no response	5	2.7%
Total	183	100.0%

<u>Plans for Wood/Coal Burning Next Year</u>		
	<u>Number</u>	<u>Percent</u>
Increase: burn more	18	9.8%
Decrease: burn less	21	11.5%
Use about the same amount	133	72.7%
Do not know/no response	11	6.0%
Total	183	100.0%

<sup>1</sup> Some households have more than one wood/coal burning appliance.

Source: Mountain International, Inc.





Burners primarily use their heating equipment in the evenings (47.0 percent) or "all of the time" (26.2 percent). Occasional use was listed by 10.4 percent of the households. Afternoon burning was comparatively rare (1.6 percent). The reported burning times shown in Table 4 are consistent with those identified by earlier Health Department surveys. That is, burning most commonly takes place in the evenings, then, the morning, late night, and afternoon.

When asked if the household planned to increase or decrease wood/coal burning next year, the vast majority (72.2 percent) anticipated using about the same amount of burning. A slightly larger share of households (11.5 percent) planned to reduce wood/coal burning than those planning to increase it (9.8 percent).

The survey tabulation also showed a weak relationship between primary household fuel and the tendency to rely on wood/coal burning for household heat. The majority (62.5 percent) of households using natural gas reported using wood/coal burning for less than 25 percent of the household's heating needs. In homes with electric heat, there was a greater tendency to use wood/coal burning to provide a larger share of the home's heating requirement. Households listing wood as the primary fuel type tended to use it almost exclusively. Other fuels such as fuel oil and bottled gas are not commonly used in the immediate Helena area and it was not possible to accurately measure their use relative to wood/coal burning. See Table 5.

#### Non-Burner Plans for Wood/Coal

Non-burner households constitute approximately 55 percent of the homes in the Helena area. Over three-quarters of the homes are fueled by natural gas, followed by electricity (11.6 percent). A smaller share of the non-burners use fuel oil, bottled gas, or other fuel types than is the case with burners. Non-burner fuel use is a reflection of



Table 5. Primary Household Fuel and Share of Heating Requirements  
Met by Wood/Coal Burning Among Burner Households.

<u>Fuel</u>	<u>Share of Heating Needs Met by Wood/Coal Burning</u>				
	<u>Less</u> <u>Than 25%</u>	<u>From</u> <u>25%-50%</u>	<u>From</u> <u>50%-75%</u>	<u>Over</u> <u>75%</u>	<u>Don't</u> <u>Know</u>
Natural gas	62.5%	14.8%	15.9%	5.7%	1.1%
Electricity	42.9%	23.8%	19.1%	14.3%	0.0%
Wood	0.0%	6.9%	12.1%	81.0%	0.0%

N = 167

Source: Mountain International, Inc.



household location. The majority of the non-burners reside inside the Helena city limits where natural gas and electricity are readily available and alternative fuels unnecessary.

About 8.5 percent of the non-burner homes (19 households) expressed the intent to install some form of wood/coal burning appliance during the next two years, predominantly wood stoves. See Table 6.

#### Helena's Air Pollution Problem

Table 7 summarizes the burner's and non-burner's perceptions of Helena's air quality. One questionnaire item specifically asked, "In your opinion, does the Helena area have an air pollution problem?". The majority of the survey respondents answered "Yes" with 61.6 percent of the non-burners replying in the affirmative compared with 54.1 percent of the burners. Perceptions regarding whether Helena had an air pollution problem were not significantly related to household location, to the age or sex of non-burners, or to the income level of burners. Among burner households, middle-aged respondents 25 to 44 years of age were more apt to agree that the area had a pollution problem than was the case among young adults or the elderly. Also, female respondents from burner households were more apt to agree that Helena had an air pollution problem than were males. This perception was the only case where females offered a point-of-view statistically different from that provided by male interviewees. Among non-burner households, those with income levels lower than \$20,000 per year were less apt to say Helena had a pollution problem than were more affluent peers.

Less than twenty percent of all survey respondents who thought Helena had an air pollution problem characterized it as "very serious." Households burning wood/coal were more apt to downplay the seriousness of Helena's pollution problem than were non-burning households but the difference is not statistically significant. Likewise, no demographic





Table 6. Non-Burning Households Plans to Use Wood/Coal.

<u>Fuel Used As Main Heating Source</u>		
	<u>Number</u>	<u>Percent</u>
Natural gas	171	76.3%
Fuel oil	4	1.8%
Electricity	26	11.6%
Bottled gas (propane, LPG)	5	2.2%
Wood	0	0.0%
Other	1	0.5%
Do not know/no response	17	7.6%
Total	224	100.0%

<u>Plan to Install Wood/Coal Burning Appliance During Next Two Years</u>		
	<u>Number</u>	<u>Percent</u>
Yes	19	8.5%
No	199	88.8%
Do not know/no response	6	2.7%
Total	224	100.0%

<u>Type of Equipment Plan to Install</u>		
	<u>Number<sup>1</sup></u>	<u>Percent</u>
Fireplace	0	0.0%
Stove	15	78.9%
Furnace	0	0.0%
Do not know/no response	4	21.1%
Total	19	100.0%

<sup>1</sup>Based on the 19 households reported above that indicated plans to install wood/coal burning appliance.

Source: Mountain International, Inc.



Table 7. Does the Helena Area Have an Air Pollution Problem.

<u>Does the Helena Area Have an Air Pollution Problem</u>				
	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Yes	99	54.1%	138	61.6%
No	77	42.1%	82	36.6%
Do not know/no response	<u>7</u>	<u>3.8%</u>	<u>4</u>	<u>1.8%</u>
Total	183	100.0%	224	100.0%

How Serious is the Helena Area's Air Pollution Problem<sup>1</sup>

	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Not serious	46	46.4%	50	36.2%
Serious	36	36.4%	53	38.4%
Very serious	15	15.2%	26	18.8%
Do not know/no response	<u>2</u>	<u>2.0%</u>	<u>9</u>	<u>6.6%</u>
Total	99	100.0%	138	100.0%

Is Helena's Air Pollution Problem Changing<sup>1</sup>

	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Getting better	21	21.2%	18	13.1%
About the same	31	31.3%	45	32.6%
Getting worse	43	43.5%	62	44.9%
Do not know/no response	<u>4</u>	<u>4.0%</u>	<u>13</u>	<u>9.4%</u>
Total	99	100.0%	138	100.0%





Table 7. Does the Helena Area Have an Air Pollution Problem  
(Continued).

	<u>During What Time of the Year is Helena's Air Pollution at Its Worst</u> <sup>1</sup>			
	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Winter	90	90.9%	116	84.0%
Spring	2	2.0%	3	2.2%
Summer	0	0.0%	3	2.2%
Fall	3	3.0%	8	5.8%
Do not know/no response	<u>4</u>	<u>4.1%</u>	<u>8</u>	<u>5.8%</u>
Total	99	100.0%	138	100.0%

<sup>1</sup>Based on the number who responded "Yes" regarding whether Helena had an air pollution problem.

Source: Mountain International, Inc.



or household characteristic was related to a response pattern a variance with that shown for the sample in Table 7.

The largest share (43.5 percent) of the respondents who felt Helena had an air pollution problem indicated that the air quality was getting worse. Burners and non-burners shared that perception. The only demographic trait that showed a different pattern of response was burner age. There, middle-aged respondents, 25 to 44 years of age, tended to agree that air pollution was getting worse more so than did older wood/coal burners.

Helena's air pollution is considered at its worst during the winter according to 86.9 percent of those who felt the community an air pollution problem. Fall ranked second with 4.6 percent of the vote. Responses to previous Health Department surveys also labeled winter as the community's air pollution season by a wide margin.

#### Sources of Helena's Air Pollution

Respondents who felt that Helena had an air pollution problem<sup>1</sup> were asked to identify the two most important causes of pollution in the area. The results are contained in Table 8. Woodsmoke was defined as the single most important cause of Helena air pollution. Non-burners cited woodsmoke 87.0 percent of the time and burners, 81.8 percent. Vehicle exhaust placed a distant second with a 43.4 percent rating overall. Windblown dust ranked third followed by sewage odors and industrial emissions. Burners were more apt to cite industrial omissions as a source of air pollution (15.1 percent) than were non-burners (6.5 percent). Except for this discrepancy there was consensus regarding the causes of Helena's air pollution. Previous surveys also placed woodsmoke and transportation (i.e., vehicle exhaust)

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<sup>1</sup> Burner = 99; Non=Burner = 138 or 58.2 percent of the total sample.



Table 8. Sources of Helena's Air Pollution.

<u>Most Important Causes of Air Pollution</u> <sup>1</sup>				
	<u>Burners</u> <sup>2</sup>		<u>Non-Burners</u> <sup>2</sup>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Woodsmoke	81	81.8%	120	87.0%
Windblown dust	12	12.1%	18	13.0%
Vehicle exhaust	42	42.4%	61	44.2%
Home heating equipment other than woodstoves	3	3.0%	1	0.1%
Sewage odors	12	12.1%	17	12.3%
Industrial omissions	15	15.1%	9	6.5%
Open burning	5	5.1%	5	3.6%
Other	9	9.1%	12	8.7%

<u>Should Something Be Done to Improve Helena's Air Quality</u>				
	<u>Burners</u> <sup>2</sup>		<u>Non-Burners</u> <sup>2</sup>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Yes	75	75.8%	116	84.1%
Maybe	5	5.1%	6	4.3%
No	15	15.1%	7	5.1%
Do not no/no response	4	4.0%	9	6.5%
Total	99	100.0%	138	100.0%

<sup>1</sup> Respondent asked to indicate the two most important causes.

<sup>2</sup> Percentages based on 99 burner households and 138 non-burner households.

Source: Mountain International, Inc.





as the two most important causes of air pollution. There were relatively few instances when demographic variables were associated with a response pattern significantly different from that reflected in Table 8. Residents of Helena's eastside placed greater emphasis on vehicle exhaust as a source of pollution than did other groups. Middle-aged (25 to 44 years), non-burners, listed windblown dust more frequently than the sample as a whole. Low to moderate income (i.e., less than \$20,000 annually), non-burner households were less apt to select woodsmoke as a pollution source than other groups. Those households were more prone to offer "no opinion" than to identify specific pollution sources.

When asked if something should be done to improve Helena's air quality, 75.8 percent of the burners and 84.1 percent of the non-burners responding to the question (N = 237) said "Yes"; 9.3 percent had "No Opinion" and 4.6 percent said "No."

When reviewing Tables 7 and 8 it is important to keep in mind that the tabulations are based upon the sub-sample of 237 persons who said, "Yes, Helena has an air pollution problem" and not the full 407 respondents that were interviewed. Fully, 42 percent of the sample do not believe that Helena has an air pollution problem or have not yet made up their minds about the matter. Among those who believe there is a pollution problem, there is a strong consensus regarding its causes (i.e., woodsmoke, vehicles) and a desire to do something to improve Helena's air quality. In total, however, both are minority positions.

#### Optional Actions to Improve Helena's Air Quality

The questionnaire presented survey respondents with eight different potential actions that could be taken to improve Helena's air quality. The respondents were asked to indicate agreement, disagreement, or no opinion on each item. Table 9 presents the results categorized by



Table 9. Optional Actions to Improve Helena's Air Quality.

		Burners		Non-Burners	
		Number	Percent	Number	Percent
<u>Option #1</u>					
Regulations limiting or prohibiting wood/coal burning on days or during certain hours when the air quality was especially poor.	Yes	108	59.0%	161	71.9%
	No	63	34.4%	45	20.1%
	No response	12	6.6%	18	8.0%
	Total	183	100.0%	224	100.0%
<u>Option #2</u>					
An user fee placed on wood/coal burning equipment with the funds used for pollution control.	Yes	31	16.9%	80	35.7%
	No	137	74.9%	122	54.5%
	No response	15	8.1%	22	9.8%
	Total	183	100.0%	224	100.0%
<u>Option #3</u>					
Standards set specifying the types of wood/coal burning equipment that could be used in the Helena area.	Yes	95	51.9%	133	59.4%
	No	72	39.3%	57	25.5%
	No response	16	8.8%	34	15.1%
	Total	183	100.0%	224	100.0%
<u>Option #4</u>					
Public education campaigns conducted to educate the public about air pollution and how they can work to correct it.	Yes	157	85.8%	188	83.9%
	No	20	10.9%	22	9.8%
	No response	6	3.3%	14	6.3%
	Total	183	100.0%	224	100.0%



Table 9. Optional Actions to Improve Helena's Air Quality (Continued).

	Burners		Non-Burners		
	Number	Percent	Number	Percent	
<u>Option #5</u>					
Pave more of the dirt/gravel roads in the Helena Valley and areas of the city.	Yes	110	60.1%	139	62.1%
	No	61	33.3%	61	27.2%
	No response	12	6.6%	24	10.7%
	Total	183	100.0%	224	100.0%
<u>Option #6</u>					
Industry required to curtail operations when the air quality is especially poor.	Yes	92	50.3%	111	49.6%
	No	73	39.9%	83	37.0%
	No response	18	9.8%	30	13.4%
	Total	183	100.0%	224	100.0%
<u>Option #7</u>					
Private vehicle transportation restricted when the air quality is especially poor.	Yes	30	16.4%	45	20.1%
	No	143	78.1%	159	71.0%
	No response	10	5.5%	20	8.9%
	Total	183	100.0%	224	100.0%
<u>Option #8</u>					
Sweep and water the city's streets and alleys more frequently to suppress dust.	Yes	109	59.6%	140	62.5%
	No	62	33.9%	71	31.7%
	No response	12	6.5%	13	5.8%
	Total	183	100.0%	224	100.0%

Source: Mountain International, Inc.





burner and non-burner household. Table 10 provides a comparison of the total sample's opinion versus the opinions of only those people who felt that Helena had an air pollution problem.

The majority of the survey respondents (66.1 percent), burner and non-burner alike, supported the notion of air quality regulations limiting or prohibiting wood/coal burning when air quality is especially poor. Non-burners show much higher level of support for such regulations (71.9) than do burners (59.0 percent). Likewise, better than twice as many non-burners (35.7 percent) than burners (16.9 percent) favor user fees placed on wood/coal burning equipment. Overall, the majority of respondents (63.6 percent) are opposed to user fees. Among burners and non-burners who feel that Helena has an air pollution problem, there is greater support for user fees than among the population at-large but, it too, remains a minority position. See Table 10.

Standards specifying the types of wood/coal burning equipment that could be used in the Helena area were favorably accepted by a small majority (56.0 percent) of the total sample, burners and non-burners alike. Again, those who felt Helena had an air pollution problem supported this option much more strongly.

The first three options listed on Tables 9 and 10 place a major part of the responsibility for improving Helena's air quality on the wood/coal burner be it through burning regulations, user fees, or equipment standards. Those types of proposals received much stronger support from non-burners and were statistically significant at the one percent level. The same pattern of response is reflected in Table 10 among persons who believe that Helena has an air pollution problem.

Option 4, a public education campaign regarding air pollution and its control, received the highest overall rating with support from 84.8 percent of all respondents. This activity was supported about equally by non-burners and burners alike.



Table 10. Opinion of Options to Improve Helena's Air Quality: Total Sample Compared with Persons Indicating that Helena Has an Air Quality Problem.

		<u>Total Sample</u> <sup>1</sup> N = 407		<u>Burners</u> <sup>2</sup> N = 99		<u>Non-Burners</u> <sup>2</sup> N = 138	
<u>Option #1</u>							
Regulations limiting or prohibiting wood/coal burning on days or during certain hours when the air quality was especially poor.	Yes	66.1%		60.6%		82.6%	
	No	26.5%		33.3%		11.6%	
	No response	7.4%		6.1%		5.8%	
	Total	100.0%		100.0%		100.0%	
<u>Option #2</u>							
An user fee placed on wood/coal burning equipment with the funds used for pollution control.	Yes	27.3%		25.2%		41.3%	
	No	63.6%		68.7%		50.7%	
	No response	9.1%		6.1%		8.0%	
	Total	100.0%		100.0%		100.0%	
<u>Option #3</u>							
Standards set specifying the types of wood/coal burning equipment that could be used in the Helena area.	Yes	56.0%		59.6%		68.1%	
	No	31.7%		34.3%		18.8%	
	No response	12.3%		6.1%		13.1%	
	Total	100.0%		100.0%		100.0%	
<u>Option #4</u>							
Public education campaigns conducted to educate the public about air pollution and how they can work to correct it.	Yes	84.8%		91.9%		90.0%	
	No	10.3%		5.1%		7.8%	
	No response	4.9%		3.0%		2.2%	



Table 10. Opinion of Options to Improve Helena's Air Quality: Total Sample Compared with Persons Indicating that Helena Has an Air Quality Problem (Continued).

		Total Sample <sup>1</sup> N = 407	Burners <sup>2</sup> N = 99	Non-Burners <sup>2</sup> N = 138
<u>Option #5</u>				
Pave more of the dirt/gravel roads in the Helena valley and areas of the city.	Yes	61.2%	56.6%	59.4%
	No	30.0%	36.3%	33.3%
	No response	8.8%	7.1%	7.3%
	Total	100.0%	100.0%	100.0%
<u>Option #6</u>				
Industry required to curtail operations when the air quality is especially poor.	Yes	49.9%	49.5%	52.2%
	No	38.3%	43.4%	37.7%
	No response	11.8%	7.1%	10.1%
	Total	100.0%	100.0%	100.0%
<u>Option #7</u>				
Private vehicle transportation restricted when the air quality is especially poor.	Yes	18.4%	14.1%	23.9%
	No	74.2%	80.8%	69.6%
	No response	7.4%	5.1%	6.5%
	Total	100.0%	100.0%	100.0%
<u>Option #8</u>				
Sweep and water the city's streets and alleys more frequently to suppress dust.	Yes	61.1%	60.6%	65.9%
	No	32.7%	33.3%	30.4%
	No response	6.2%	6.1%	3.7%
	Total	100.0%	100.0%	100.0%

<sup>1</sup>Includes all 407 survey respondents.

<sup>2</sup>Includes only the 99 burners and 138 non-burners who said that Helena has an air pollution problem.

Source: Mountain International, Inc.





There was a strong level of support for paving more streets and roads in the city and county (61.2 percent) and for sweeping/watering city streets/alleys to suppress dust (61.1 percent). Just shy of half of the sample concurred with the idea of curtailing industrial operations when air quality was especially poor. There was limited support (18.4 percent) for the idea of restricting private vehicle transportation when the air quality is poor. Burners and non-burners showed almost identical opinions on each of these options. Refer to Table 9.

Among persons who felt that Helena had an air pollution problem there was a greater tendency to endorse all remedial options than was the case for the general public. That tendency was especially strong with actions directly impacting wood/coal burning, much less so with steps such as sweeping streets, public education, and restricting vehicle transportation.

It is particularly worthwhile to compare Table 8, sources of Helena's air pollution, with Table 9, options available to correct pollution. Woodsmoke is singled out as the most important cause of air pollution. The preferred remedial actions directed at reducing woodsmoke tend to be indirect in nature such as burning regulations which largely depend on voluntary compliance, and equipment standards. User fees for wood/coal burning are strongly opposed. There is virtually no support for restricting vehicle use even though exhaust emissions were identified as the second most important cause of local air pollution. Likewise, about 50 percent of the sample favored curtailing industrial activity even though industry was not ranked as an important pollution source. It ranked fifth out of seven pollution categories.

The general attitude expressed toward dealing with Helena's air pollution problem is best described as "indirect action" through public education, equipment standards, burning regulations, and dust



suppression. Actions such as restricting vehicle use or user fees for wood/coal burning that would place a direct economic or social cost on individual households are strongly rejected.

A number of demographic variables were associated with various levels of support for the remedial options identified in Tables 9 and 10. Among burners, burning regulations were least favored by households with an income under \$10,000 annually. Equipment standards were most strongly supported by persons in the \$10,000-\$20,000 income bracket. When burner age is considered there tends to be an almost linear decline in support for all remedial measures with increasing age. That pattern is sharpest regarding equipment standards, user fees, and curtailing industrial operations. Persons under 24 years of age show higher levels of support for restricting vehicle use as a pollution control device than do other age groups.

Among non-burners, there is also a general decline in support for equipment standards with increasing respondent age. Young adult and middle-aged non-burners also endorsed user fees more strongly than did other groups.

Respondent sex and household location were not correlated with a specific opinion pattern at variance with the sample as a whole either among burners or non-burners.

Table 11 shows the survey respondent's assessment of the parties responsible for paying to improve Helena's air quality. The local taxpayer received the most ballots overall but was only named by 43.7 percent of the households. Burners were more apt to suggest that pollution control was a community problem primarily to be corrected by the taxpayer. Non-burners endorsed that position by less than two percentage points. Instead, non-burners placed a larger share of the clean-up responsibility on "local households that burn wood/coal." Local industry was listed about one-quarter of the time and a similar



Table 11. Party to Be Responsible for Paying to Improve Helena's Air Quality.

	<u>Burners<sup>1</sup></u>		<u>Non-Burners<sup>1</sup></u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Local taxpayer	90	49.2%	88	39.3%
Local vehicle owner	24	13.1%	30	13.4%
Local households that burn wood/coal	50	27.3	84	37.5%
Local industry	42	23.0%	58	25.9%
Other	58	31.7%	46	20.5%

<sup>1</sup>Based on 183 burner households and 224 non-burner households.  
Respondent asked to list all that apply.

Source: Mountain International, Inc.





share of respondents identified "other" sources of responsibility, principally combinations of taxpayers (e.g., government), industry, and households. Some of the more unique suggestions said that cleanup responsibility rested with the environmentalists, the truckers, the Montana Power Company, lottery proceeds, the state coal tax, and people with long hair.

#### Information About Air Quality

Table 12 identifies the most common sources of public information about local air quality. Two-thirds of the homes listed the local newspaper followed, in order, by radio (33.9 percent), television (25.8 percent), and personal observation (24.8 percent). Less than two percent mentioned direct contacts with the Lewis and Clark County Health Department or Air Quality Hotline. Burners and non-burners listed the various information media in the same approximate proportions with two exceptions. Burners cited radio as an information source more frequently while non-burners listed personal observation more commonly.

Table 13 summarizes responses to two questions regarding air quality monitoring. Over three-quarters of the population knew that Helena's Air Quality was being regularly monitored. Burners (86.9 percent) were significantly more aware of air quality monitoring than were non-burners (67.4 percent). Over two-fifths of the sample (42.5 percent), however, directly acknowledged that they did not know who conducted local air quality monitoring. Another 23.6 percent had no response. In total, 66.1 percent of the population did not know which agency monitors Helena's air quality. The Lewis and Clark Health Department was correctly identified in one fashion or another by 54 households, or 13.3 percent. The state Department of Health was cited in 44 instances or by 10.8 percent of the cases. Thereafter, a wide array of public and private agencies were identified ranging from the U.S. Weather Service and Highway Maintenance Shop to the ASARCO Smelter, telephone company, and civil defense.



Table 12. Most Common Sources of Information About Air Quality.

	<u>Number</u>	<u>Percent</u> <sup>1</sup>
Newspaper	270	66.3%
Radio	134	33.9%
Television	105	25.8%
Personal observation	101	24.8%
Other persons	18	4.5%
County Health Department	7	1.7%
All other	19	4.7%

<sup>1</sup>Based on total of 407 survey respondents. Each respondent to list up to two sources of information.

Source: Mountain International, Inc.



Table 13. Air Quality Monitoring.

<u>Does Any Governmental or Private Entity Regularly Monitor Helena's Air Quality</u>				
	<u>Burners</u>		<u>Non-Burners</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Yes	159	86.9%	151	67.4%
No	13	7.1%	40	17.9%
Do not know/no response	11	6.0%	33	14.7%
Total	183	100.0%	224	100.0%

<u>Which Agency Monitors Air Quality</u>			
	<u>Subtotal</u>	<u>Number</u>	<u>Percent</u>
Do not know	--	173	42.5%
Lewis and County Health Department	42		
The County	6		
Joan Miles	4		
City/County Control Board	1		
Local Air Quality Committee	1		
Total	54	54	13.3%
State Health Department	22		
Air Quality Bureau	14		
State Board of Health	6		
Environmental Sciences Division	1		
Environmental Health	1		
Total	44	44	10.8%
Miscellaneous Governmental			
U.S. Weather Bureau	7		
Environmental Protection Agency	7		
The Government	4		
Airport	2		
Forest Service	1		
OSHA	1		
Highway Maintenance Shop	1		
Civil Defense	1		
Total	24	24	5.9%





Table 13. Air Quality Monitoring (Continued).

	<u>Subtotal</u>	<u>Number</u>	<u>Percent</u>
Miscellaneous Private			
The Newspaper	7		
Television Station	2		
ASARCO Smelter	1		
Air Monitor on Bank	1		
Telephone Company	<u>1</u>		
Total	12	12	2.9%
Purely Miscellaneous			
Helena Air	--	4	1.0%
No Response		<u>96</u>	<u>23.6%</u>
Grand Total		407	100.0%

Source: Mountain International, Inc.



APPENDIX



## AIR QUALITY STATISTICS

October 83

Good - 11

Watch - 4

Poor - 0

Hotline calls = 646 or  
38 calls per day

October 84

Good - 19

Watch - 4

Poor - 0

Hotline calls = 105 or  
6 calls per day

November 83

Good - 22

Watch - 8

Poor - 0

Hotline calls = 946 or  
31 calls per day

November 84

Good - 22

Watch - 8

Poor - 0

Hotline calls = 29 or  
1 call per day

December 83

Good - 13

Watch - 10

Poor - 5

Hotline calls = 3,199 or  
103 calls per day

December 84

Good - 15

Watch - 11

Poor - 5

Hotline calls = 4,331 or  
109 calls per day

January 84

Good - 21

Watch - 4

Poor - 3

Hotline calls = 1,065 or  
36 calls per day

January 85

Good - 8

Watch - 16

Poor - 7

Hotline calls = 5,750 or  
250 calls per day

February 84

Good - 19

Watch - 6

Poor - 0

Hotline calls = 1,145 or  
39 calls per day

February 85

Good - 25

Watch - 3

Poor - 0

Hotline calls = 3,550 or  
122 calls per day

*84-85 Season*

Exceeded State's 24 hour Primary Air Standard 2

Exceeded Federal 24 hour Primary Air Standard 1

Exceeded Federal 24 hour Secondary Air Standard 5x





Column  
(1-5)

Data Bank No. \_\_\_\_\_

HELENA AIR QUALITY SURVEY  
SPRING 1984

(All Households)

Instructions: Read each question to the respondent and check the most appropriate answer from the list provided. Some questions require the interviewer to read list of potential answers. Specific instructions are provided at the end of each question.

First, I want to ask you a few questions about home heating.

1. What fuel is used by the main heating equipment in your residence?  
(check one)

(6)

- \_\_\_\_\_ 1. Natural gas  
\_\_\_\_\_ 2. Fuel oil  
\_\_\_\_\_ 3. Electricity  
\_\_\_\_\_ 4. Bottled gas (propane, LPG)  
\_\_\_\_\_ 5. Wood  
\_\_\_\_\_ 6. Other (please specify): \_\_\_\_\_  
\_\_\_\_\_ 7. Do not know

2. Does your household burn either wood or coal to heat the home or garage? (check one)

(7)

- \_\_\_\_\_ 1. No. If no, skip to "non-burners" category, on pink colored sheet  
\_\_\_\_\_ 2. Yes. If yes, answer "burners" category, on blue colored sheet



BURNERS ONLY

3. What type of wood/coal burning equipment does your household have?  
(check all that apply).
- (10) \_\_\_\_\_ 1. Fireplace (12) \_\_\_\_\_ 1. Furnace  
(11) \_\_\_\_\_ 1. Stove (13) \_\_\_\_\_ 1. Other (please specify)  
\_\_\_\_\_
4. How many wood/coal appliances does your household have and use?  
(check one)
- (14) \_\_\_\_\_ 1. One \_\_\_\_\_ 4. More than three  
\_\_\_\_\_ 2. Two \_\_\_\_\_ 5. Do not know/no opinion  
\_\_\_\_\_ 3. Three
5. Does your household burn coal? (check one)
- (15) \_\_\_\_\_ 1. Do not know/no opinion  
\_\_\_\_\_ 2. No  
\_\_\_\_\_ 3. Yes
6. How long has your household been burning wood/coal? (fill in space  
with number of years)
- (16-17) \_\_\_\_\_  
Years
7. Approximately what share of your households' heating needs are  
met by wood/coal burning? (read list and check one)
- (18) \_\_\_\_\_ 1. Less than one-quarter (25 % or less)  
\_\_\_\_\_ 2. Between one quarter and one half (25% to 50%)  
\_\_\_\_\_ 3. Between one half and three-quarters (50% to 75%)  
\_\_\_\_\_ 4. More than three-quarters (75% or more)  
\_\_\_\_\_ 5. Do not know
8. What time of day does your household use its wood/coal burning  
appliance most often? (check one)
- (19) \_\_\_\_\_ 1. Mornings (6:00 AM to Noon)  
\_\_\_\_\_ 2. Afternoons (Noon to 6:00 PM)  
\_\_\_\_\_ 3. Evenings (6:00 PM to Midnight)  
\_\_\_\_\_ 4. Nights (Midnight to 6:00 AM)  
\_\_\_\_\_ 5. Virtually all the time  
\_\_\_\_\_ 6. Just on occasion  
\_\_\_\_\_ 7. Do not know/no opinion
9. Does your household plan to increase, decrease, or use about  
the same amount of wood/coal next year. (check one)
- (20) \_\_\_\_\_ 1. Increase: Burn more  
\_\_\_\_\_ 2. Decrease: Burn less  
\_\_\_\_\_ 3. Use about the same amount of fuel  
\_\_\_\_\_ 4. Do not know/no opinion



BURNERS ONLY

Next, I have a few questions about air quality.

10. In your opinion, does the Helena area have an air pollution problem? (check one)
- (21) \_\_\_\_\_ 1. Do not know/no opinion  
\_\_\_\_\_ 2. No. If no or no opinion, skip to question 16  
\_\_\_\_\_ 3. Yes
11. If yes, how serious is the Helena area's air pollution problem? (check one)
- (22) \_\_\_\_\_ 1. Not serious  
\_\_\_\_\_ 2. Serious  
\_\_\_\_\_ 3. Very serious  
\_\_\_\_\_ 4. Do not know/no opinion
12. Do you think Helena's air pollution problem is getting better, worse, or about the same. (check one)
- (23) \_\_\_\_\_ 1. Getting better \_\_\_\_\_ 3. Getting worse  
\_\_\_\_\_ 2. About the same \_\_\_\_\_ 4. Do not know/no opinion
13. In your opinion, during what season or time of the year is Helena's air pollution at its worst? (check one)
- (24) \_\_\_\_\_ 1. Winter \_\_\_\_\_ 4. Fall  
\_\_\_\_\_ 2. Spring \_\_\_\_\_ 5. Do not know/no opinion  
\_\_\_\_\_ 3. Summer
14. In your opinion, what are the two most important causes of Helena's air pollution? (read list and check two)
- (25) \_\_\_\_\_ 1. Woodsmoke  
(26) \_\_\_\_\_ 1. Wind blown dust  
(27) \_\_\_\_\_ 1. Vehicle exhaust  
(28) \_\_\_\_\_ 1. Home heating equipment other than woodstoves (i.e., furnaces, hot water heaters)  
(29) \_\_\_\_\_ 1. Odors from sewage treatment facilities  
(30) \_\_\_\_\_ 1. Industrial omissions  
(31) \_\_\_\_\_ 1. Open burning of forest slash, weeds, and waste  
(32) \_\_\_\_\_ 1. Other (please specify) \_\_\_\_\_
15. In your opinion, should something be done to improve Helena's air quality? (check one)
- (33) \_\_\_\_\_ 1. Yes  
\_\_\_\_\_ 2. Maybe  
\_\_\_\_\_ 3. No  
\_\_\_\_\_ 4. Do not know/no opinion





BURNERS ONLY

16. There are several different actions government can implement to improve Helena's air quality. I am going to read a series of statements, please tell me "yes" if you think such action should be taken or "no" if you do not. (check one on each item)

- (34)     \_\_\_\_\_ 1. Yes     a. Regulations limiting or prohibiting wood/coal  
         \_\_\_\_\_ 2. No         burning on days or during certain hours when  
         \_\_\_\_\_ 3. No opin. the air quality was especially poor.
- (35)     \_\_\_\_\_ 1. Yes     b. An user fee placed on wood/coal burning  
         \_\_\_\_\_ 2. No         equipment with the funds used for pollution  
         \_\_\_\_\_ 3. No opin. control.
- (36)     \_\_\_\_\_ 1. Yes     c. Standards set specifying the types of wood/coal  
         \_\_\_\_\_ 2. No         burning equipment than could be used in the  
         \_\_\_\_\_ 3. No opin. Helena area.
- (37)     \_\_\_\_\_ 1. Yes     d. Public education campaigns conducted to educate  
         \_\_\_\_\_ 2. No         the public about air pollution and how they can  
         \_\_\_\_\_ 3. No opin. work to correct it.
- (38)     \_\_\_\_\_ 1. Yes     e. Pave more of the dirt/gravel roads in the  
         \_\_\_\_\_ 2. No         Helena valley and areas of the city.  
         \_\_\_\_\_ 3. No opin.
- (39)     \_\_\_\_\_ 1. Yes     f. Industry required to curtail operations when  
         \_\_\_\_\_ 2. No         the air quality is especially poor.  
         \_\_\_\_\_ 3. No opin.
- (40)     \_\_\_\_\_ 1. Yes     g. Private vehicle transportation restricted when  
         \_\_\_\_\_ 2. No         the air quality is especially poor.  
         \_\_\_\_\_ 3. No opin.
- (41)     \_\_\_\_\_ 1. Yes     h. Sweep and water the city's streets and alleys  
         \_\_\_\_\_ 2. No         more frequently to suppress dust.  
         \_\_\_\_\_ 3. No opin.
- (42)     \_\_\_\_\_ 1. Yes     i. Other (please specify): \_\_\_\_\_  
         \_\_\_\_\_ 2. No         \_\_\_\_\_  
         \_\_\_\_\_ 3. No opin. \_\_\_\_\_



BURNERS ONLY

17. If steps are taken to improve Helena's air quality, who should pay for the cost of that effort? (check all that apply)

- (43) \_\_\_\_\_ 1. The local taxpayer  
(44) \_\_\_\_\_ 1. Local vehicle owners  
(45) \_\_\_\_\_ 1. Local households that burn wood/coal  
(46) \_\_\_\_\_ 1. Local industry  
(47) \_\_\_\_\_ 1. Other (please specify) \_\_\_\_\_

18. What are your two most common sources of information about Helena air quality? (fill in the blank spaces)

(48-49) \_\_\_\_\_  
\_\_\_\_\_

19. To your knowledge, does any governmental or private entity regularly monitor Helena's air quality and advise the public of its condition? (check one)

- (50) \_\_\_\_\_ 1. Do not know/no opinion )  
\_\_\_\_\_ 2. No ) If checked, skip to question 21  
\_\_\_\_\_ 3. Yes

20. If yes, what agency monitors air quality in Helena? (fill in the blank space)

(51) \_\_\_\_\_  
answer

Finally, I have three quick questions regarding your household.

21. In what general area of Helena is your household located? (read list and check one)

- (52) \_\_\_\_\_ 1. City of Helena, west of Last Chance Gulch  
\_\_\_\_\_ 2. City of Helena, east of Last Chance Gulch  
\_\_\_\_\_ 3. East of Helena, La Casa Grande/or Eastgate  
\_\_\_\_\_ 4. Helena Valley, west of of Montana Avenue  
\_\_\_\_\_ 5. Helena Valley, east of Montana Avenue  
\_\_\_\_\_ 6. Kessler School/Highway 12 West/Birdseye Road area  
\_\_\_\_\_ 7. Montana City/Clancy area  
\_\_\_\_\_ 8. Other (please specify): \_\_\_\_\_  
\_\_\_\_\_



BURNERS ONLY

22. What is your age? (read list and check one)

- (53)
- |       |    |                           |
|-------|----|---------------------------|
| _____ | 1. | Less than 18 years of age |
| _____ | 2. | 18 to 24 years            |
| _____ | 3. | 25 to 34 years            |
| _____ | 4. | 35 to 44 years            |
| _____ | 5. | 45 to 54 years            |
| _____ | 6. | 55 to 64 years            |
| _____ | 7. | 65 to 74 years            |
| _____ | 8. | More than 75 years of age |

23. What was the total estimated annual income of your household last year before taxes. (check one)

- (54) \_\_\_\_\_ 1. Less than \$10,00  
 \_\_\_\_\_ 2. Between \$10,000 and \$20,000  
 \_\_\_\_\_ 3. Between \$20,000 and \$30,000  
 \_\_\_\_\_ 4. Between \$30,000 and \$40,000  
 \_\_\_\_\_ 5. Between \$40,000 and \$50,000  
 \_\_\_\_\_ 6. Over \$50,000

24. Do not ask, just record:

- (55) Sex of respondent: \_\_\_\_\_ 1. Male  
2. Female





NON-BURNERS ONLY

3. Do you plan to or think you may install a wood/coal burning appliance in your home during the next two years? (check one)
- (8)        ☐ 1. Do not know/no opinion  
          ☐ 2. No  
          ☐ 3. Yes

4. If yes, what type of equipment do you anticipate installing? (check one)
- (9)        ☐ 1. Do not know/no opinion        ☐ 3. Stove  
          ☐ 2. Fireplace                                ☐ 4. Furnace

Next, I have a few questions about air quality.

5. In your opinion, does the Helena area have an air pollution problem? (check one)
- (21)        ☐ 1. Do not know/no opinion  
          ☐ 2. No. If no or no opinion, skip to question 11  
          ☐ 3. Yes
6. If yes, how serious is the Helena area's air pollution problem? (check one)
- (22)        ☐ 1. Not serious  
          ☐ 2. Serious  
          ☐ 3. Very serious  
          ☐ 4. Do not know/no opinion
7. Do you think Helena's air pollution problem is getting better, worse, or about the same. (check one)
- (23)        ☐ 1. Getting better                                ☐ 3. Getting worse  
          ☐ 2. About the same                                ☐ 4. Do not know/no opinion
8. In your opinion, during what season or time of the year is Helena's air pollution at its worst? (check one)
- (24)        ☐ 1. Winter    ☐ 4. Fall  
          ☐ 2. Spring    ☐ 5. Do not know/no opinion  
          ☐ 3. Summer



NON-BURNERS ONLY

9. In your opinion, what are the two most important causes of Helena's air pollution? (read list and check two)

- (25) \_\_\_\_\_ 1. Woodsmoke  
(26) \_\_\_\_\_ 1. Wind blown dust  
(27) \_\_\_\_\_ 1. Vehicle exhaust  
(28) \_\_\_\_\_ 1. Home heating equipment other than woodstoves (i.e.,  
furnaces, hot water heaters)  
(29) \_\_\_\_\_ 1. Odors from sewage treatment facilities  
(30) \_\_\_\_\_ 1. Industrial omissions  
(31) \_\_\_\_\_ 1. Open burning of forest slash, weeds, and waste  
(32) \_\_\_\_\_ 1. Other (please specify) \_\_\_\_\_

10. In your opinion, should something be done to improve Helena's air quality? (check one)

- (33) \_\_\_\_\_ 1. Yes  
\_\_\_\_\_ 2. Maybe  
\_\_\_\_\_ 3. No  
\_\_\_\_\_ 4. Do not know/no opinion



NON-BURNERS ONLY

11. There are several different actions government can implement to improve Helena's air quality. I am going to read a series of statements, please tell me "yes" if you think such action should be taken or "no" if you do not. (check one on each item)
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         \_\_\_\_\_ 2. No       burning on days or during certain hours when  
         \_\_\_\_\_ 3. No opin. the air quality was especially poor.
- (35)     \_\_\_\_\_ 1. Yes    b. An user fee placed on wood/coal burning  
         \_\_\_\_\_ 2. No       equipment with the funds used for pollution  
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         \_\_\_\_\_ 3. No opin. work to correct it.
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         \_\_\_\_\_ 2. No       Helena valley and areas of the city.  
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         \_\_\_\_\_ 2. No       the air quality is especially poor.  
         \_\_\_\_\_ 3. No opin.
- (40)     \_\_\_\_\_ 1. Yes    g. Private vehicle transportation restricted when  
         \_\_\_\_\_ 2. No       the air quality is especially poor.  
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         \_\_\_\_\_ 2. No       more frequently to suppress dust.  
         \_\_\_\_\_ 3. No opin.
- (42)     \_\_\_\_\_ 1. Yes    i. Other (please specify): \_\_\_\_\_  
         \_\_\_\_\_ 2. No       \_\_\_\_\_  
         \_\_\_\_\_ 3. No opin. \_\_\_\_\_



NON-BURNERS ONLY

12. If steps are taken to improve Helena's air quality, who should pay for the cost of that effort? (check all that apply)

- (43) \_\_\_\_\_ 1. The local taxpayer  
(44) \_\_\_\_\_ 1. Local vehicle owners  
(45) \_\_\_\_\_ 1. Local households that burn wood/coal  
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13. What are your two most common sources of information about Helena air quality? (fill in the blank spaces)

(48-49) \_\_\_\_\_  
\_\_\_\_\_

14. To your knowledge, does any governmental or private entity regularly monitor Helena's air quality and advise the public of its condition? (check one)

- (50) \_\_\_\_\_ 1. Do not know/no opinion )  
\_\_\_\_\_ 2. No ) If checked, skip to question 16  
\_\_\_\_\_ 3. Yes

15. If yes, what agency monitors air quality in Helena? (fill in the blank space)

(51) \_\_\_\_\_  
answer

Finally, I have three quick questions regarding your household.

16. In what general area of Helena is your household located? (read list and check one)

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\_\_\_\_\_ 2. City of Helena, east of Last Chance Gulch  
\_\_\_\_\_ 3. East of Helena, La Casa Grande/or Eastgate  
\_\_\_\_\_ 4. Helena Valley, west of of Montana Avenue  
\_\_\_\_\_ 5. Helena Valley, east of Montana Avenue  
\_\_\_\_\_ 6. Kessler School/Highway 12 West/Birdseye Road area  
\_\_\_\_\_ 7. Montana City/Clancy area  
\_\_\_\_\_ 8. Other (please specify): \_\_\_\_\_  
\_\_\_\_\_





## NON-BURNERS

17. What is your age? (read list and check one)

- (53)
- |                   |                              |
|-------------------|------------------------------|
| <u>          </u> | 1. Less than 18 years of age |
| <u>          </u> | 2. 18 to 24 years            |
| <u>          </u> | 3. 25 to 34 years            |
| <u>          </u> | 4. 35 to 44 years            |
| <u>          </u> | 5. 45 to 54 years            |
| <u>          </u> | 6. 55 to 64 years            |
| <u>          </u> | 7. 65 to 74 years            |
| <u>          </u> | 8. More than 75 years of age |

18. What was the total estimated annual income of your household last year before taxes. (check one)

- (54) \_\_\_\_\_ 1. Less than \$10,000  
 \_\_\_\_\_ 2. Between \$10,000 and \$20,000  
 \_\_\_\_\_ 3. Between \$20,000 and \$30,000  
 \_\_\_\_\_ 4. Between \$30,000 and \$40,000  
 \_\_\_\_\_ 5. Between \$40,000 and \$50,000  
 \_\_\_\_\_ 6. Over \$50,000

19. Do not ask, just record:

- (55) Sex of respondent: \_\_\_\_\_ 1. Male  
2. Female





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